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## The Effect of Articulation Therapy on the Accurate Use of Phonemes in Non-Imitative Speech Tasks

Elizabeth Baker  
*University of Central Florida*

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THE EFFECT OF ARTICULATION THERAPY ON THE  
ACCURATE USE OF PHONEMES IN  
NON-IMITATIVE SPEECH TASKS

BY

ELIZABETH BAKER

B.S., State University of New York at Geneseo, 1973

THESIS

Submitted in partial fulfillment of the requirements  
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The majority of a public school speech clinician's caseload is made up of children with articulation disorders; and, these clinicians have been successful in treating these problems. Helmick (1976) reported that a group of second-graders who received articulation therapy reduced their speech errors by 88%; while a group who did not receive therapy reduced their errors by only 26%. Although all clinicians do not employ a standardized therapy treatment, the various therapy techniques employed share common characteristics. Weiss, Lillywhite, and Gordon (1980) describe treatment phases that are common to various approaches: planning, establishment or learning the sound, transfer or generalization, and maintenance or stabilization.

The so-called "traditional" approach to articulation therapy was devised in 1939 by Van Riper (1972). Van Riper recommended that therapy follow a sequence of training the sound in isolation level, syllable level, word level, sentence level and, finally, in all types of speaking. Treatments developed since Van Riper have advocated different rationales and specific techniques, but, many maintain Van Riper's concept that treatment should pro-



gress from simple to complex levels of production (McCabe & Bradley, 1975; McDonald, 1964; Winitz, 1976). Winitz has questioned the value of teaching the sound in isolation. He cites several reasons for not including isolation training: a) the facilitating effects of coarticulation cannot be observed, b) transfer to syllables and words has been relatively poor, c) the principle of shaping cannot be used; since, it requires a variety of phonetic contexts, d) only continuants can be produced in isolation; stops and glides can be produced only in syllables.

In treating articulation disorders, clinicians frequently report "carryover" or transfer of the sound to all speaking situations as their most difficult problem. Most therapy approaches include this level as part of the training sequence, including those developed by Winitz, Van Riper, McCabe and Bradley, and Mowrer (1971). Techniques have been described to facilitate carryover within therapy settings and outside therapy settings.

#### Transfer of Training

Transfer of training is said to occur whenever a previously learned skill has an influence on the acquisition, performance or relearning of a new skill (McGeoch & Irion, 1952). In all areas of learning, a student is expected to master a new concept based upon what he has



already learned. Once a student has learned a concept or skill, this knowledge should help him acquire a similar concept or skill.

Transfer of training is positive when learning one task facilitates learning a second task. Negative effects are demonstrated if the first task inhibits learning a second task. Zero transfer occurs when the first task has no effect on learning the second task (Mowrer, 1971).

Positive transfer is certainly the desired effect of training. Several variables may affect the degree of positive transfer that will occur. The first is the amount of training an individual receives. The greater the amount of training on a task, the greater is the degree of positive transfer expected. The amount of time between learning the first task and presentation of the second task will affect positive transfer. A relatively long time between tasks can be tolerated. Finally, the student's attitude toward learning the first task affects learning the second task. This attitude is referred to as the student's "set" (Mowrer, 1977).

Two forms of positive transfer have been defined by Mowrer (1977): stimulus generalization and response generalization. Stimulus generalization occurs when a learned response to a particular stimulus tends to be



elicited by similar stimuli. Stimulus generalization occurs more frequently in learning and is said to be the means by which generalization is accomplished (McLean, 1970). McLean proposes that by increasing the conditions under which a response is functional, it will tend to become functional under similar conditions through the process of generalization. Generalization is the process whereby a response which has been reinforced in the presence of a certain stimulus complex is emitted, a) in the presence of stimuli not available during training, or, b) in the absence of reinforcement (Holland & Skinner, 1961). Because stimulus generalization does occur, constant relearning of a task under new stimulus conditions is not necessary. The second form of positive transfer, response generalization, occurs infrequently. Response generalization is demonstrated when one stimulus evokes several different responses.

Negative transfer of training has been demonstrated in learning; but, it happens less frequently than positive transfer. It occurs if learning a second task is more difficult because of what was learned during the first task. Under negative transfer condition, the stimuli remain similar; but, the response is different.

#### Transfer of Training in Articulation Therapy

Positive transfer of training and generalization of correct articulation to new conditions has been demon-



strated in clinical studies. Elbert and McReynolds (1978) described variables which play an important role in the kinds of generalization exhibited by individual children. The individual child's stimulability, or the ability to imitate, is one determiner of generalization. In the study, Elbert and McReynolds found that stimulability scores predicted correct production of /s/ regardless of phonetic context. A second predictor of generalization is the amount of training an individual requires. The amount of training individuals need before generalization begins is quite variable. Finally, the various error patterns which individuals bring to therapy affect the generalization expected.

Three types of generalization may result from articulation therapy: intratherapy generalization, extratherapy generalization and/or carryover (Griffiths & Craighead, 1972). Intratherapy generalization is another term for stimulus generalization in therapy. Within the therapy setting, responses occurring in the presence of one set of stimuli will occur without reinforcement in the presence of additional sets of stimuli. Extratherapy generalization is the occurrence of correct responses on a given task either outside the therapy session or when the task is conducted by an examiner other than the clinician. Carryover is the transfer of correct articulation from a



therapy environment to spontaneous speech.

Transfer of training across phonemes. Studies have shown that positive transfer may occur when a child is trained on one sound and then required to produce another similar sound. Elbert, Shelton and Arndt (1967) trained children to correctly articulate the /s/ and predicted improvement on their misarticulated /z/ which was not trained. The results indicated that their subjects improved not only on production of /s/, but also on production of /z/. More recent interest in distinctive features has aided in explaining transfer of training from one phoneme to a similar phoneme. It is expected that when a feature is absent from a child's repertoire, training him to produce a phoneme in which that feature is relevant will result in generalization of the feature to other appropriate phonemes (McReynolds & Bennett, 1972). Features should generalize to other phonemes without training on each phoneme. McReynolds and Bennett analyzed the misarticulations of children according to distinctive feature errors and trained their subjects in features missing from their repertoires. They found that training a feature in the context of one phoneme resulted in generalization to other phonemes requiring the feature. The degree of generalization across all appropriate phonemes, however, was not equal.



Transfer of training across phonetic contexts.

Training a phoneme in one phonetic context is expected to facilitate production of the phoneme in other phonetic contexts. In training children who misarticulated the /r/ sound, it was found that some children made more correct responses to some untrained /r/ allophones than to others (Wright & Diedrich, 1971). Elbert and McReynolds (1975) trained subjects in one of four allophonic syllables of /r/. After training, most of the children increased in their correct responses to untrained items on a probe. The authors summarized that training on any one of the four syllables facilitated generalization to some untrained syllables; but, not all children generalized to all four syllables.

In their later study, Elbert and McReynolds (1978) examined the generalized articulation responses of subjects according to context, during the course of training. Children who misarticulated the /s/ were trained in three contexts. Throughout training, probes were administered to determine if the /s/ was produced correctly in some contexts over others. The effects of context on generalization were not strong. Although the subjects tended to produce syllables and words according to trained contexts, the trend was inconsistent. In this study, context did not play as important a role in generalization as did



stimulability, amount of training and the individual's error patterns.

Transfer of training across positions. Research to demonstrate that teaching a phoneme in one position will facilitate learning the sound in other positions has yielded conflicting results. Powell and McReynolds (1969) examined articulation generalization during a training program which included these phases: isolated /s/ training and training /s/ in the initial, final and medial positions of syllables. The position of /s/ had no influence on the position to which generalization occurred, when probed after each phase. Results indicated that when a child generalized, he generalized to all positions regardless of the position trained. The correct production of /s/ in one position began to control correct production in other positions.

McLean (1970) studied generalization of articulation training by young adult mentally retarded males. A phoneme was trained in the initial position of words. McLean found that complete generalization of the trained phoneme occurred only to new words with the sound in the initial position. No across position generalization was demonstrated. With the population in this study, training a sound in one position assisted transfer only when the position was held constant.



Transfer within and across levels of production. The transfer of a trained sound from syllable level to words has been demonstrated in research. Powell and McReynolds (1969) trained children at isolation and syllable levels, and later administered a probe test including untrained words. As a result of training, all subjects generalized to some degree from nonsense syllable training to untrained words. Some subjects generalized completely, others did not. The authors suggest that training in syllables will transfer to untrained words, but individuals vary as to the degree of generalization. Further research reports that transfer of correct articulation to untrained levels begins when the sound is taught in the context of other phonemes, particularly in syllables (McReynolds, 1972). Children were trained for /s/ in isolation and syllables. A twelve word probe was administered as a measure of transfer. No transfer was noted after isolation training; but, about 50% transfer occurred after syllable training was initiated. Winitz (1975) suggests that a nonsense syllable reduces interference from the error sound; thus, rapid transfer to other syllabic contexts, whether in words or nonsense items, is to be expected.

It is predicted that transfer of the correct sound will occur from words taught in therapy to new words. Mowrer, Baker and Shutz (1968) obtained 100% generaliza-



tion to five untrained words on a thirty word criterion test, in which the other twenty-five words were used in training. In the Powell and McReynolds (1969) study, however, word training resulted in little improvement for transfer to new words, if transfer had not taken place after syllable training. They trained subjects further at word level who had not generalized to the probe words after syllable training. These subjects did not achieve much more generalization from trained words to untrained words.

Teaching a phoneme in therapy results in generalization to untrained words, sentences and syllables (Elbert, Shelton & Arndt, 1967; Shelton, Elbert & Arndt, 1967). In two studies these authors administered a Sound Production Task (SPT) consisting of words, sentences, and syllables not used in therapy, at different points during the therapy program. Both studies showed improved scores on the SPT during training. No data were reported, however, to support that more generalization occurred at one level of production over another or that complete generalization occurred on any one level of production.

Wright, Shelton and Arndt (1969) compared SPT scores with Reading Task scores and Talking Task scores, during an articulation training program. While the subjects improved on the SPT, they made less improvement on the



Reading Task and least improvement on the Talking Task. None of the subjects established consistent, correct production on the more spontaneous tasks, reading and talking. Correct articulation on an imitative SPT is not expected to be representative of articulation in non-imitative speech.

Although the degree of transfer from training to the talking task for the subjects in the Wright, et al. (1969) study was significantly less than transfer to the SPT, it was noted that as SPT scores improved, so did talking task scores. Diedrich and Bangert (1980) report similar findings in their study of public school articulation therapy. Data from school speech clinicians supported that as SPT improves, a conversation task (TALK) follows right behind, but to a greater degree than reported in Wright, et al. In the Diedrich and Bangert study, the child's transfer of a sound to conversational speech with his clinician and with another adult was compared. Speech samples during therapy with the child's own clinician were found to be representative of his speech outside therapy with another adult. McCabe and Bradley found a different effect in a similar study. Their clients demonstrated 10% greater accuracy in conversation with their clinicians than with other listeners (Bradley, Note 1).

#### Transfer of training across stimulus conditions.

Several studies have examined the process of generalization



of correct articulation from one stimulus condition to another. In a study of stimulus shift, McLean (1970) obtained generalization of articulation across different evoking stimuli with three of four subjects. He suggested that once a phoneme was evoked at consistently high levels under one stimulus, the correct response could be shifted to another stimulus. Additionally, generalization between stimulus types appears to increase by each extension of the number of stimulus types which control the response.

Griffiths and Craighead (1972) examined articulation generalization of a mentally retarded adult woman, after teaching correct articulation with McLean's stimulus shift method. During training, the subject's correct articulation also was measured outside the therapy setting by other examiners. No extratherapy generalization of correct articulation was observed until reinforcement for correct responses was given in the second settings.

Generalization also has been demonstrated when the physical stimulus conditions of therapy are manipulated (Costello & Bosler, 1976). Subjects received articulation training at home by their mothers and were periodically administered a probe in the clinic setting. The physical dimensions which were altered during the probe sessions included the examiner, location, and testing structure. The subjects transferred correct articulation to a high degree to the various clinic settings, but, their



responses to untrained words were not as high as to trained words under the altered settings.

Bankson and Byrne (1972) observed that a certain amount of transfer to different stimulus settings takes place without the introduction of structured techniques. Four of five subjects in their study acquired various degrees of carryover to spontaneous speech after drilling the trained sound with a word list. The subjects were tested for generalization at home with a parent, at school with the clinician and in a new setting with a stranger. The degree of transfer was greatest, however, in the school setting.

#### Measuring Articulation Change

Clinicians are anxious to demonstrate and provide evidence of a client's improved articulation. To evaluate a child's progress in therapy, clinicians have traditionally administered standardized tests before and after the therapy program. Positive differences on these tests have been accepted as proof of articulation change.

Rather than limit progress assessment to pre- and post-tests, Aungst and McDonald (1973) suggest that periodic assessments during the therapy program will help the clinician gather valuable information about a client's progress. Periodic assessments can give information about the therapeutic process; it allows an investigation



of the relationship between the treatment employed and changes in articulation (Elbert, et al., 1967).

Clinicians also may evaluate their own effectiveness by periodically evaluating their clients. Finally, assessments during the therapy process may provide evaluation of the measuring instruments themselves.

Imitative articulation tasks. Elbert, et al., (1967) measured articulation change on a lesson to lesson basis by administering a Sound Production Task (SPT). The sixty item SPT included words, sentences, syllables, and isolated phonemes and was presented on an imitative basis to obtain the best possible responses in the least amount of time. Periodic administration of the SPT indicated that children make rapid improvement in early lessons and continue to make improvements at a slower pace. Although these authors also gave a pre- and post-test with a conventional articulation test, the periodic SPT revealed more information about articulation changes during therapy.

Shelton, et al., (1967) used a thirty item SPT to measure lesson to lesson changes in therapy. The SPT not only established baseline and post-therapy scores; but, it was also given at the beginning and end of each lesson. Scores at the end of a lesson contained more correct responses than pre-lesson scores during the first and last



thirds of the entire therapy period, but not during the middle third. The SPT scores also indicated that while some children lose correct responses from the end of one lesson to the beginning of the next, others increase their numbers of correct responses during this interval. Imitative articulation tasks like the SPT have been useful to researchers in evaluating day to day articulation change and therapy effectiveness.

Non-imitative articulation tasks. Although improvement in therapy has been demonstrated with the SPT, Wright, et al. (1969) commented that the improvement shown may not be associated with correct phoneme usage in more spontaneous, non-imitative speech. Wright, et al. compared the scores on a thirty item imitative SPT with scores on non-imitative talking and reading tasks. The subject groups made improvement on the SPT scores, but made much less improvement on the talking tasks. The reading scores fell between the SPT and the talking task scores. For the talking task and reading task, none of the subjects established consistently correct usage of the phoneme taught; but, some subjects were consistent on the imitative SPT. The results support the idea that articulation change involves acquisition periods and automatization periods. It is suggested that acquisition work precede automatization training; and, different techniques



should be developed for each goal. Winitz (1975) proposed that when a certain level of success is achieved in words and phrases, the degree of transfer to non-imitative speech be assessed. Further data are necessary to help clinicians decide when to move from acquisition to automatization training.

Faircloth and Faircloth (1970) criticized the use of standard single word articulation tests as measures of articulation behavior. The concept of initial, final, and medial positions of sounds in words has little validity for connected speech. The authors described the articulation of a speech defective child as it occurred in single words and connected speech. Differences in the two levels of articulation were found in the numbers of phones and syllables produced, with single words containing greater numbers of both. The single word productions were judged more intelligible; and, intelligibility was found to be closely related to syllabic integrity. Syllabic integrity was more important to intelligibility than consonantal integrity. Evaluation of articulation from connected speech will obtain a more dynamic view of a client's phonological system.

A method of assessing articulation with an articulation protocol that includes words and sentences as well as reading and conversation was suggested by McCabe and Bradley (1973). During the assessment, a whole word is



counted as an accurate response only if all phonemes in that word are produced correctly. A percentage of whole word accuracy is computed for each level of production on the protocol; and, a percentage of accuracy is also computed for the entire instrument. The whole word accuracy concept allows a clinician to obtain descriptive data regarding articulation changes. The time required to administer and analyze this assessment is reported to be minimal, and it allows the clinician to observe changes at several levels of production.

Diedrich (1971) developed a method to determine and record how well a child is using his target phoneme in conversation. The task, called TALK, involves analysis of three minutes of client-clinician conversation. The analysis consists of counting the target phoneme as correct or wrong during the speech sample and charting the results as # correct/minute and # wrong/minute. Diedrich cites several advantages for clinicians who use the TALK as a measure of articulation change: a) charts reveal articulation learning curves, which can be compared across clinicians and children because a standard measure is used; b) the charted learning curves can be used to regroup children who show similar articulation learning patterns; c) the procedure is easily learned by clinicians who work with large numbers of children and wish to keep



records for each individual child; d) TALK can be compared with an imitative measure to observe the relationship between acquisition and automatization.

#### Significiance of the Study

Research has described the transfer of articulation skills across phonemes, contexts, positions in words, levels of production and stimulus conditions. It would be beneficial to investigate the degree of transfer to conversation that occurs after each stage of the therapy sequence. Information from such a study may indicate an alteration in the traditional sequence of therapy. Results might suggest that increased emphasis be placed on some stages of therapy, while emphasis may be decreased on others.



### Statement of the Problem

The purpose of this study is to determine the effect of sequenced articulation therapy on the accurate use of a trained phoneme in non-imitative speech tasks. The following research question is proposed: Does a statistically significant difference exist in the accurate use of error phonemes in non-imitative speech tasks among the following conditions: baseline sampling, after syllable training, word training, sentence training, reading training and cued, reinforced conversation training?



## Methodology

### Test and Therapy Site

All testing and therapy was done in the speech room at Idyllwilde School, Sanford, Florida.

### Subjects

The subjects were ten children. The study population met the following requirements:

- a. range in age from six to ten years;
- b. have hearing acuity within normal limits, that is 20 dB threshold according to ANSI standards for the frequencies of 500, 1,000, 2,000, 4,000 Hz;
- c. met speech therapy criteria established by the Seminole County School Board.

### Instrumentation

The TALK assessment consisted of three minutes of recorded client-clinician conversation from which correct and incorrect productions of the error phoneme were counted and charted. Picture and verbal stimuli were used to elicit the speech sample.

The whole word accuracy assessments were taken from one hundred words of conversational speech. Each word was counted as correct only if all phonemes in the word were



correctly produced.

As the results of the McCabe and Bradley (Bradley, 1981) and the Diedrich and Bangert (1980) studies are equivocal, the present study employed only client-clinician conversation samples.

All whole word accuracy and TALK conversations were recorded on a Sony Cassette-Corder tape recorder with Memorex MRX-3 cassette tape. Audiotronics HS-20 headphones were used to listen to the tape recordings.

#### Procedure

All subjects were administered a standardized articulation test to determine eligibility for speech therapy. Students were scheduled for therapy two, three, or four times a week, according to the scheduling procedures traditionally followed by the school clinician. Before therapy was initiated, each subject was administered the TALK and 100-word whole-word accuracy measures as a baseline. Subjects received therapy for their error phonemes; and, the therapy sequence included training in syllables, words, sentences, reading, and conversation. When a subject mastered a level of training by reaching 90% correct production or 85% correct production for two consecutive days, the TALK and whole-word accuracy measures were re-administered. These non-imitative speech measures were obtained after each level of training.



## Results

The experimental procedure required the scoring of responses from tape recordings as well as during the live tasks. The experimenter's reliability in scoring responses was established using the Pearson product-moment correlation. Thirty TALK conversations were chosen using the Table of Random Digits; and, the live and taped scores of these samples were compared. The calculated  $r$  value was  $+.94$ . This is significant at the  $.01$  level. The same procedure was applied to thirty live and taped scores of whole word accuracy conversations. The calculated  $r$  value was  $+.90$  and was significant at the  $.01$  level. Since reliability was established between the scores obtained during the live tasks and those obtained by listening to the tape recordings, the scores obtained during the live tasks were used to analyze the data of this study.

Twelve subjects initiated this study; but, complete data was collected from only ten subjects. One subject moved during the school year; and, the other subject completed criteria only up to word level in the therapy sequence. Three subjects received therapy for more than



one error sound; and, their error sounds shared few, if any, distinctive features. Two subjects' error phonemes were /s/ and /r/; the third subject's error phonemes were /f/ and /w/.

For both the TALK and whole word accuracy tasks, a number of correct and incorrect responses were obtained from each subject at baseline and after the following therapy levels: syllable, word, sentence, reading and conversation. The numbers correct and incorrect were converted to percentages correct and incorrect. For each level of therapy, the percentages correct for each subject were added to obtain a total percentage correct. Table 1 shows the mean percentages correct obtained after each therapy level for the TALK and whole-word accuracy measures.

Table 1  
Mean Percentages of Correct Responses After  
Therapy at Various Levels

Task	base- line	syllables	words	sentences	read- ing	conver- sation
whole word accuracy	80.5	85.0	83.0	84.2	85.4	88.3
TALK	36.7	57.0	75.8	77.9	74.3	86.0



An analysis of variance for a single factor experiment with repeated measures was used to determine if a statistically significant difference exists in the accurate use of error phonemes in a non-imitative speech task among the following conditions: at baseline, after therapy on syllables, words, sentences, reading and conversation. The ANOVA for the whole word accuracy data yielded a nonsignificant F ratio of 1.16, with  $df = 5,45$ . The ANOVA was applied to the TALK task data and yielded an  $F = 8.24$ , with  $df = 5,45$ . A significant difference was found among the TALK task scores at the .05 level.

Using the TALK task data, the total percentages of correct responses for each therapy level were compared by the Newman-Keuls procedure to determine where significant differences between totals lie (Winer, 1971). This procedure showed significant differences at the .05 level between these scores: a) at baseline and after syllable training, b) at baseline and after word training, c) at baseline and after sentence training, d) at baseline and after reading training, e) at baseline and after conversation training, and f) between scores after syllable training and conversation training.



### Discussion

Two non-imitative speech tasks were administered to subjects before therapy began and after they completed each stage of the therapy sequence. These tasks were used to investigate the degree of transfer to non-imitative speech that occurs after each level of therapy training. The results obtained indicate that a significant difference in the correct use of an error phoneme exists between TALK task measures taken at baseline and those taken after each level of therapy, and between TALK task measures after syllable training and after conversation training. No significant difference was shown between whole word accuracy measures taken at baseline and after any level of therapy.

The findings from the TALK task data do not contradict the principle of the traditional sequence of therapy. The subjects started to transfer the correct use of their error sound to a non-imitative task early in therapy, after syllable training. Conversation training was a beneficial stage of therapy. The total percentage of correct use in the TALK task was greatest after conversation training. The differences among the measures taken after word, sentence and reading training were



insignificant; although, each of these measures yielded a significant difference when compared to the baseline. The mean percentages of correct use after word, sentence and reading levels showed differences ranging from only 1.5% to 3.6%. These results suggest that the value of these three therapy stages be examined further. Another study might evaluate the degree of transfer contributed by each therapy level by administering various combinations of the therapy sequence among many subject groups. Clinicians also might consider merging the three stages into one or two stages.

During the therapy process, the subjects did not make any significant change in their correct use of an error phoneme as measured by the whole word accuracy count in conversation. The total percentages of correct use on this task did increase, however, in the expected direction. As in the TALK task results, subjects started to use the correct sound in whole word accuracy conversations after the first stage of therapy, syllable training. The value of conversation training was supported by the whole word accuracy scores. The total percentage of correct use was greatest after this level of therapy.

Whole word accuracy measures may not have demonstrated significant changes; since, this study examined changes in only one error phoneme for each subject.



Therapy for a single phoneme did not significantly affect whole word accuracy scores. Further studies of subjects who have multiple phoneme errors or of subject groups who demonstrate a greater variety of error phonemes may yield different results. Also, picture stimuli were used to elicit responses in the TALK task. The subjects may have perceived the pictures as stimuli to use their best possible articulation. No such stimuli were used to elicit whole word accuracy conversations. It should be noted also that one subject's (Subject 3) whole word accuracy scores did not increase in the expected direction. This subject's scores fell from 77% at baseline to 49% after conversation training. For discussion purposes, an ANOVA was re-computed without Subject 3's scores. The analysis yielded an  $F = 4.18$ , with  $df = 5,40$ . This was significant at the .05 level. Table 2 contrasts the mean percentages of correct responses on the whole word accuracy conversations for the nine subjects and for all ten subjects.



Table 2  
Mean Percentages of Correct Responses  
on the Whole Word Accuracy Conversations

	base- line	after syllables	after words	after sentences	after reading	after conver- sation
with subject 3	80.5	85.0	83.0	84.0	85.4	88.3
without subject 3	80.9	85.56	87.0	87.0	88.78	92.67

The total percentages of correct responses for both the TALK and the whole-word accuracy measures did not increase in a sequential pattern. The TALK task scores increased through sentence level, decreased after reading level and increased after conversation training. Whole word accuracy scores increased from baseline to syllable level, decreased after word level, then continued to increase through the remaining stages. It was noted that some subjects showed an awareness of their articulation during the conversations; while, other subjects did not demonstrate an awareness. In the initial stages of therapy, the more perceptive subjects were likely to use slow, exaggerated speech in an effort to correctly produce their error phonemes. As therapy progressed,



the conversations became more spontaneous. The scores of some subjects after the early stages of therapy, then, may be high due to their deliberate articulation; and, the scores may not be representative of the subject's articulation in conversations with other listeners. Another study might investigate a subject's transfer of correct phoneme use to non-imitative speech with an unknown listener, as well as with his own clinician.

The quality of language obtained during the conversation samples might have affected the correct use of the error phonemes. The youngest subject used almost all single word responses in the initial conversation tasks; but, his use of connected speech increased by the later stages of therapy. It was mentioned earlier that this subject's whole word accuracy score fell from 77% to 49%. As the results of the Faircloth and Faircloth (1970) study suggest, some children's articulation is more intact for single words than it is for connected speech. Other subjects' conversation samples included more connected speech as the subjects became more at ease with the clinician, over time.

Analysis of the scores taken at time of the conversations and those taken from the tape recordings indicate a strong relationship between the two methods of scoring. These findings suggest that clinicians can be accurate



in judging articulation during live conversations. Since no extra tape recording equipment or analysis time is required to administer a conversation task, this method of measuring articulation change would be convenient. Clinicians would find the results of the TALK task useful for reporting a client's progress to classroom teachers, parents and principals. The progress of one child can be charted or the progress of a group can be charted using mean or total percentages. Articulation learning patterns also can be outlined for one client or for one client compared to a group, as suggested by Diedrich (1971).



### Summary

This study examined the correct use of an error phoneme in non-imitative speech, during the course of articulation therapy. Ten subjects were administered two non-imitative conversation tasks at baseline and after each level of therapy: syllable, word, sentence, reading and cued, reinforced conversation. The subjects' correct use of their error phonemes changed significantly when compared to the baseline in a conversation task (TALK) which measures use of only the error sound. TALK task scores also showed that differences in correct phoneme use among word, sentence and reading levels were not significant. In a measure of whole word accuracy, articulation at baseline and after each level of therapy did not differ significantly. A task which measures correct use of only the error phoneme in non-imitative speech may be a method of assessing articulation generalization and of reporting articulation change within therapy settings and outside therapy settings.



## References

- Aungst, L. F., & McDonald, E. T. Evaluating articulation therapy. In W. D. Wolfe & D. J. Goulding (Eds.), Articulation and Learning. Springfield, Il.: Charles C. Thomas, 1973.
- Bankson, N. W., & Byrne, M. C. The effect of a timed correct sound production task on carryover. Journal of Speech and Hearing Research, 1972, 3, 160-168.
- Costello, J., & Bosler, S. Generalization and articulation instruction. Journal of Speech and Hearing Disorders, 1976, 41, 359-373.
- Diedrich, W. M. Procedures for counting and charting a target phoneme. Language, Speech and Hearing Services in the Schools, 1971, 2, 18-32.
- Diedrich, W. M., & Bangert, J. Articulation Learning. Houston: College-Hill Press, 1980.
- Elbert, M., & McReynolds, L. V. Transfer of /r/ across contexts. Journal of Speech and Hearing Disorders. 1975, 40, 380-387.
- Elbert, M., & McReynolds, L. V. An experimental analysis of misarticulating children's generalization. Journal of Speech and Hearing Research, 1978, 21, 136-150.
- Elbert, M., Shelton, R. L., & Arndt, W. B. A task for evaluation of articulation change: I. Development of Methodology. Journal of Speech and Hearing Research, 1967, 10, 281-288.
- Faircloth, M.A., & Faircloth, S. R. An analysis of the articulatory behavior of a speech defective child in connected speech and in isolated-word responses. Journal of Speech and Hearing Disorders, 1970, 35, 51-61.
- Griffiths, H., & Craighead, W. E. Generalization in operant speech therapy for misarticulation. Journal of Speech and Hearing Disorders, 1972, 37, 485-494.



- Helmick, J. W. Effects of therapy on articulation skills in elementary-school children. Language, Speech and Hearing Services in the Schools, 1976, 7, 169-172.
- Holland, J., & Skinner, B. J. The Analysis of Behavior. New York: McGraw-Hill, 1961.
- McCabe, R. B., & Bradley, D. P. Pre- and postarticulation therapy assessment. Language, Speech and Hearing Services in the Schools, 1973, 4, 13-22.
- McCabe, R., & Bradley, D. Systematic multi-phonemic approach to articulation therapy. Acta Symbolica, 1975, 6, 1-18.
- McDonald, E. Articulation Testing and Treatment: A Sensory-Motor Approach. Pittsburgh: Stanwix House, Inc., 1964.
- McGeoch, J. A., & Irion, A. L. The Psychology of Human Learning. New York: Longmans, Green, 1952.
- McLean, J. Extending stimulus control of phoneme articulation by operant techniques. In F. L. Girardeau & J. E. Spradlin (Eds.), A Functional Analysis Approach to Speech and Language: ASHA Monographs 14. Washington: American Speech and Hearing Association, 1970.
- McReynolds, L. V. Articulation generalization during articulation training. Language and Speech, 1972, 15, 149-155.
- McReynolds, L. V., & Bennett, S. Distinctive feature generalization in articulation training. Journal of Speech and Hearing Disorders, 1972, 37, 462-470.
- Mowrer, D. E. Transfer of training in articulation therapy. Journal of Speech and Hearing Disorders, 1971, 36, 427-446.
- Mowrer, D. E. Methods of Modifying Speech Behaviors. Columbus, Oh.: Charles E. Merrill, 1977.
- Mowrer, D. E., Baker, R. L. & Shutz, R. E. Operant procedures in the control of speech articulation. In H. Sloane & B. MacAuley (Eds.) Operant Procedures in Remedial Speech and Language Trainings. Boston: Houghton-Mifflin, 1968.



- Powell, J., & McReynolds, L. A procedure for testing position generalization from articulation training. Journal of Speech and Hearing Research, 1969, 12, 629-645.
- Shelton, R. L., Elbert, M., & Arndt, W. B. A task for evaluation of articulation change: II. Comparison of task scores during baseline and lesson series testing. Journal of Speech and Hearing Research, 1967, 10, 578-585.
- Van Riper, C. Speech Correction Principles and Methods. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.
- Weiss, C. E., Lillywhite, H. S. & Gordon, M. E. Clinical Management of Articulation Disorders. St. Louis: C. V. Mosley Company, 1980.
- Winer, B. J. Statistical Principles in Experimental Design. New York: McGraw-Hill, 1971.
- Winitz, H. From Syllables to Conversation. Baltimore: University Park Press, 1975.
- Wright, V., & Diedrich, W. M. Context analysis of /r/ and /s/. American Speech and Hearing Association, 1971, 13, 549.
- Wright, V., Shelton, R. L., & Arndt, W. B. A task for evaluation of articulation change: III. Imitative task scores compared with scores for more spontaneous tasks. Journal of Speech and Hearing Research, 1969, 12, 875-884.



Reference Note

1. Bradley, D. P. Personal communication, April 24, 1981.